UNIVERSITÀ DEGLI STUDI DI BERGAMO | Dipartimento di Ingegneria Gestionale, dell'Informazione e della Produzione

22059 – APPLIED TOPICS IN MANAGEMENT ENGINEERING

Excel, Access and Matlab

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AGENDA

Lecture X

- RELATIONSHIPS BETWEEN TABLES
  - Inner join
    - Example
  - Left join
    - Example
  - Right join

  - Complex example

- FURTHER MATERIAL
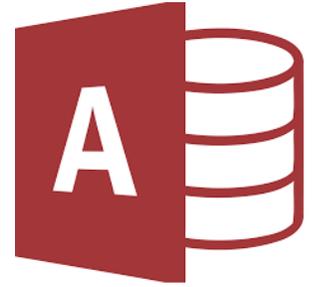
RELATIONSHIPS BETWEEN TABLES
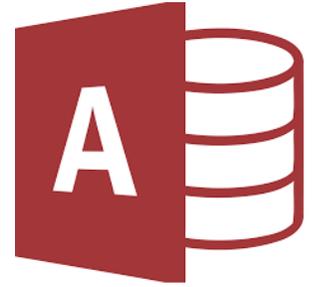
- You often need to add information from one table to another table in order to have a single table containing all the information.

<div style="border: 2px solid red; text-align: center;">

How to do it?

You may use a JOIN.

</div>

- There are different types of join. We will focus on:

  - Inner join
  - Left join → It includes all of the rows from the table on the left and only those records from the table on the right that match the join field in the left table.

  - Right join → It includes all of the rows from the table on the right and only those rows from the table on the left that match the join field in the right table.

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Inner join

- It includes rows in the query only when the joined field matches records in both tables.

- It the most common type of join.

- This type of join requires a comparison operator to match rows from the participating tables based on a common field or column of both the tables.

- Access automatically creates inner joins if you add two tables to a query.
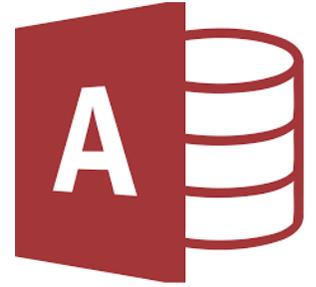
```
SELECT table1.column1, table2.column2...
FROM table1
INNER JOIN table2
ON table1.common_field = table2.common_field;
```

Fig.1: Inner join Syntax

Example

You want to add the income bracket to each student in the database.

- To do this, you have to use two different tables:

  1. FASCIA REDDITO for the income bracket.

  2. DATABASE STUDENTI for the list of students.

- By imposing the join on the freshman, which is common to both tables, Access, for each freshman in the table containing the list of students, will search for the corresponding value in the "Fascia reddito" table.

- Through the query, the column in "Database studenti" table will be added to the "Fascia reddito" table.
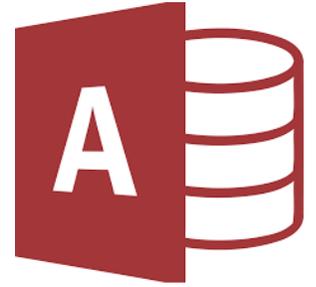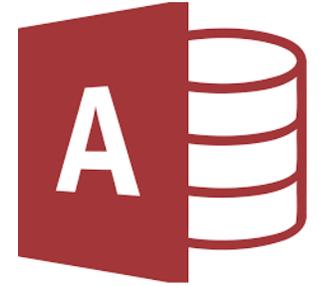
Example

- Create a select query by following the known steps.
- Then, right-click on the main screen.
- Select "Show table".
- The Show table window will appear.
- Choose the "Fascia reddito" table.
- The "Fascia reddito" table will appear near the "Database studenti" table.
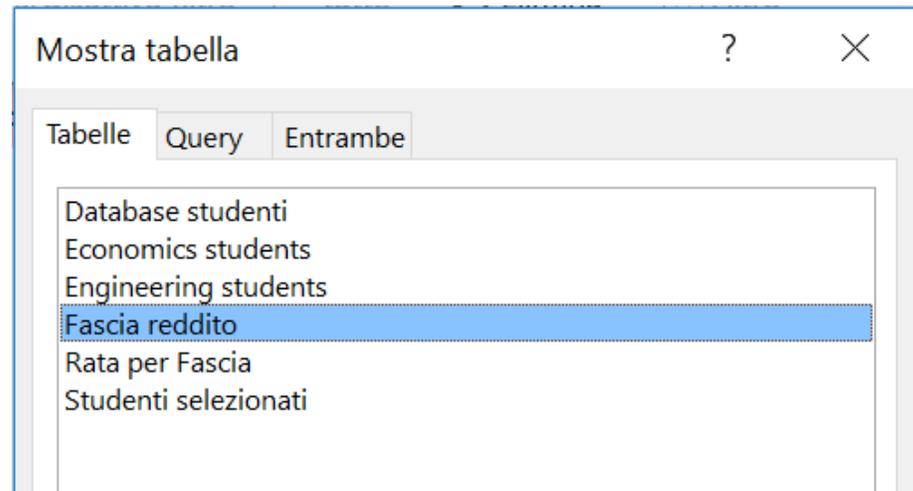
Fig.2: Show table window
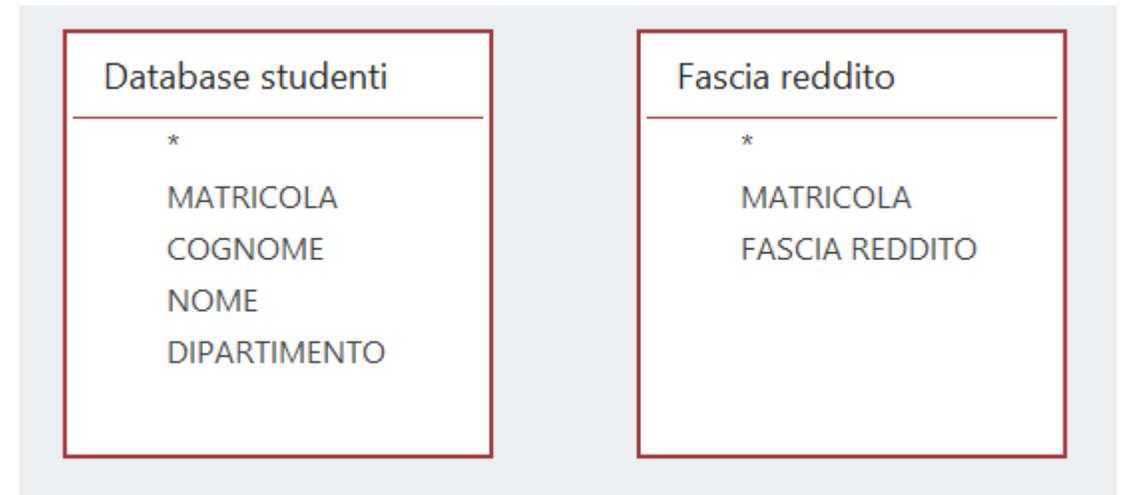
Fig.3: Visualization of the two tables

Example

- To create the inner join, click on Freshman heading of the "Database studenti" table and drag it onto the Freshman heading of the "Fascia reddito" table.

Fig.4: Inner join between the two tables

- If you right-click on the line representing the inner join, you can select "Join properties".

- The Join properties window will appear.

- You can choose:
  1. Inner join
  2. Left join
  3. Right join

Fig.5: Join properties window

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Example

- In the Query Builder you have to add the "Fascia reddito" column by writing "Fascia reddito" in the "Field" row.

- Automatically, in the "Table" row will appear Fascia reddito.

- Check the show box under "Fascia reddito" column.
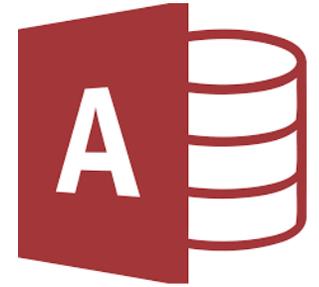
Campo:	[MATRICOLA]	[COGNOME]	[NOME]	[DIPARTIMENTO]	FASCIA REDDITO
Tabella:	Database studenti	Database studenti	Database studenti	Database studenti	Fascia reddito
Ordinamento:					
Mostra:	☑	☑	☑	☑	☑
Criteri:					
Oppure:					

Fig.6: Query Builder

- Now, click on Run.

Example

- The "Database studenti" query will open.

Fig.7: Inner join in "Database studenti" quey

The «Fascia reddito» column has been added to «Database studenti» table.

NB.
For each frashman in «Database studenti» table the corresponding income bracket in the «Fascia reddito» table has been found.

Left join

- It returns all rows from the left table, even if there are no matches in the right table.

- This means that a left join returns all the values from the left table, plus matched values from the right table or NULL in case of no matching join predicate.
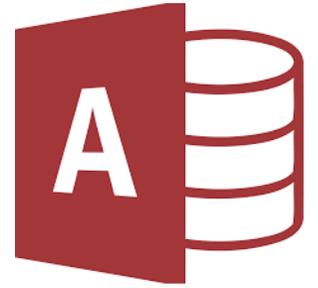
```
SELECT table1.column1, table2.column2...
FROM table1
LEFT JOIN table2
ON table1.common_field = table2.common_field;
```

Fig.8: Left join Syntax

Example

You want to add to the students' database a column to indicate who has already paid the installment.
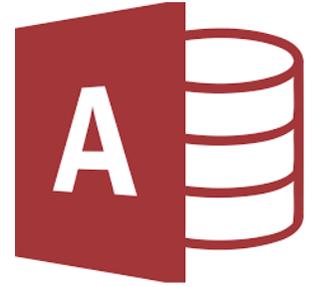
- To do this, you have to use two different tables:

  1. DATABASE STUDENTI, for the list of students.

  2. PAGATO, for the list of students who have already paid.

- By imposing the left join on the freshman and the last name, which are common to both tables, Access will report all fields of the "Database studenti" table and only records of the "Pagato" table where the linked fields are the same.

Example

- Create a select query by following the known steps.
- Then, right-click on the main screen.
- Select "Show table".
- The Show table window will appear.
- Choose the "Pagato" table.
- The "Pagato" table will appear near the "Database studenti" table.
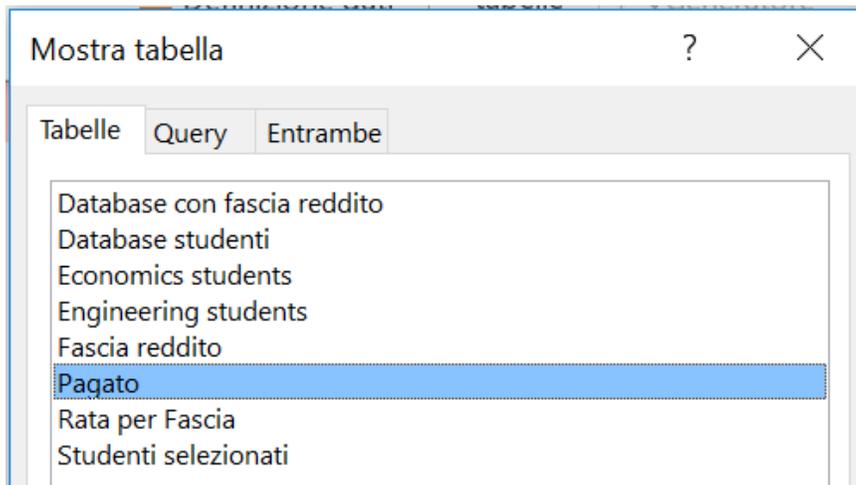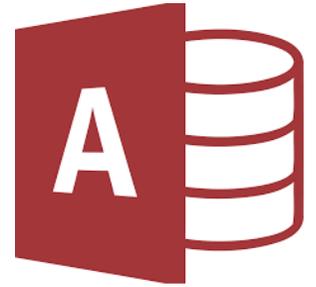
Fig.9: Show table window
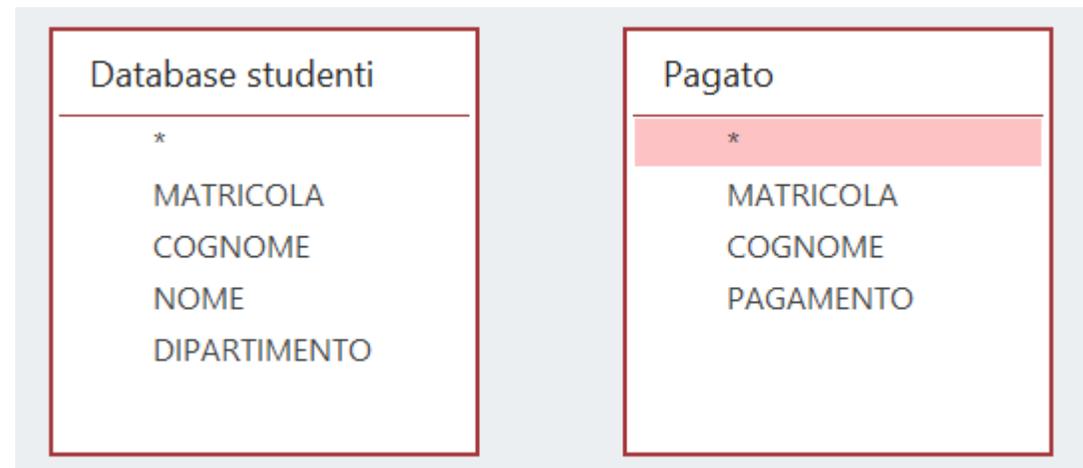
Fig.10: Visualization of the two tables

Example

- To create the left join, click on Freshman heading of the "Database studenti" table and drag it onto the Freshman heading of the "Pagato" table.

- Do the same for Last name heading.

- If you right-click on the line representing the left join, you can select "Join properties".

- The Join properties window will appear.

- You have to choose the "left join" option represented by the option 2 for both the lines.
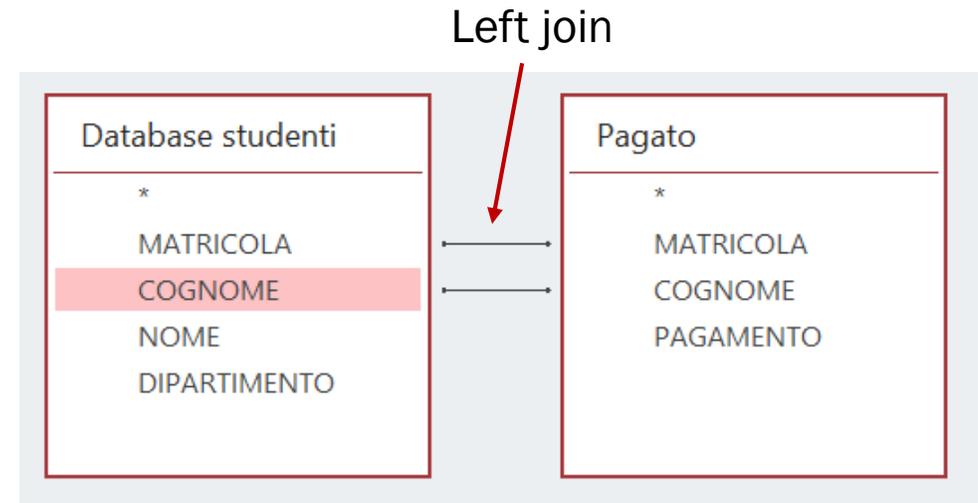
Left join

Fig.11: Left join between the two tables

Fig.12: Join properties window

Example

- In the Query Builder you have to add the "Pagamento" column by double clicking on the field "Pagamento" in "Pagato" table.

- Automatically, in the "Table" row will appear Pagato.
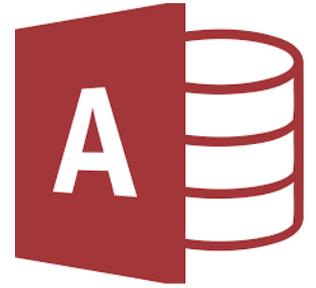
Campo:	[MATRICOLA]	[COGNOME]	[NOME]	[DIPARTIMENTO]	PAGAMENTO
Tabella:	Database studenti	Database studenti	Database studenti	Database studenti	Pagato
Ordinamento:					
Mostra:	✓	✓	✓	✓	✓
Criteri:					
Oppure:					

Fig.13: Query Builder

- Now, click on Run.

Example

- The query result will open.
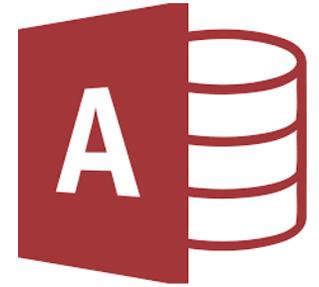
MATRICOLA	COGNOME	NOME	DIPARTIMEN	PAGAMENTO
2034512	BIANCHI	CLARA	GIURISPRUDEN	1
2034513	FRANCO	CORRADO	GIURISPRUDEN	
2034514	FERRARO	ALBERTO	ECONOMIA	
2034515	LONGO	REBECCA	LINGUE	
2034516	GALLI	MANLIO	ECONOMIA	1
2034517	LEONE	DORIANA	ECONOMIA	
2034518	BASILE	GIOVANNA	LETTERE	
2034519	FERRARA	DANIELE	ECONOMIA	
2034520	SORRENTINO	FULVIO	GIURISPRUDEN	
2034521	PELLEGRINO	ANITA	ECONOMIA	
2034522	VITALE	NADIA	ECONOMIA	1

Fig.14: Left join result

The «Pagamento» column has been added to «Database studenti» table.

NB.
For each frashman and related last name in «Database studenti» table that has correspondence within the «Pagato» table, Access will add a 1 in the Pagamento column.

Right join

- It returns all rows from the right table, even if there are no matches in the left table.

- This means that a right join returns all the values from the right table, plus matched values from the left table or NULL in case of no matching join predicate.
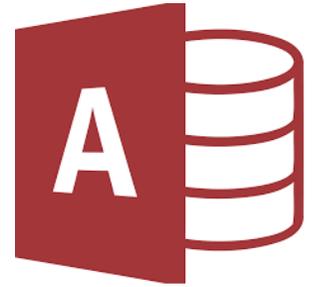
```
SELECT table1.column1, table2.column2...
FROM table1
RIGHT JOIN table2
ON table1.common_field = table2.common_field;
```

Fig.15: Right join Syntax

Right join

- The result of a query which contains a right join is more or less the same of that of a query with a left join.

- The difference is that Access will report all the fields of the right table and only the records of the left table where the linked fields are the same.

- Therefore, the right join performs the same operation as the left join, but with inverted tables.
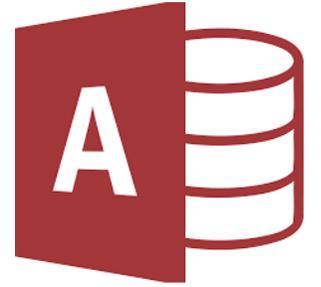
Complex example

- Below has been carried out a more complex example in which three tables and two inner joins have been used.

You want to know how much money the university should raise from each individual department.

- Create a select query by following the known steps.

- Then, right-click on the main screen.

- Select "Show table".

- The Show table window will appear.
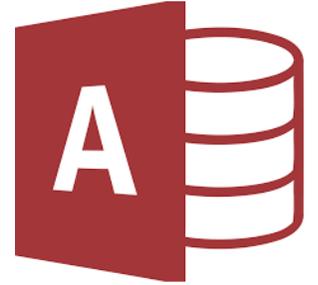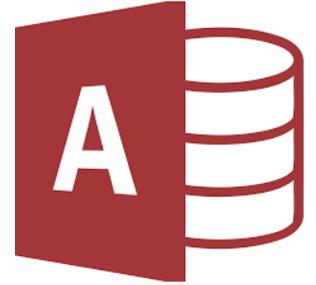
- Choose the "Fascia reddito" table. Then, click on add.

- The "Fascia reddito" table will appear near the "Database studenti" table.

- Choose the "Rata per fascia" table. Then, click on add.

- The "Rata per fascia" table will appear near the previous two.
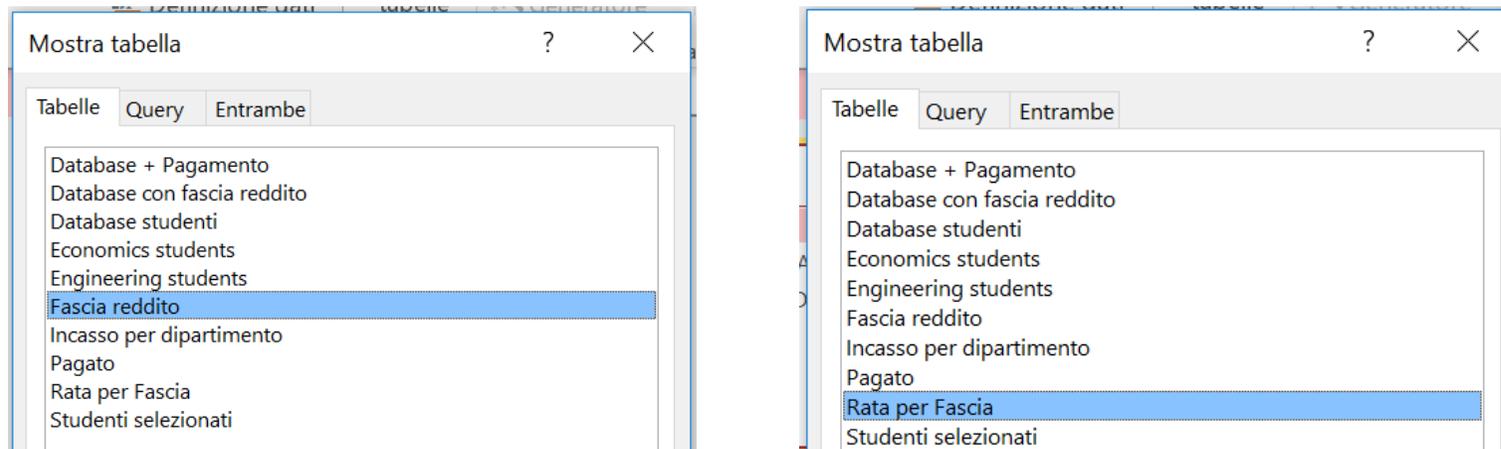
Fig.16: Show table window

RELATIONSHIPS BETWEEN TABLES   - Complex example
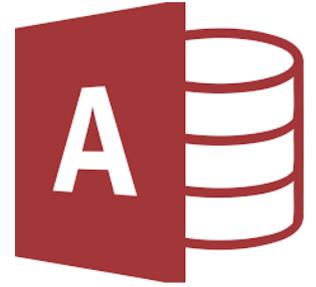
- Now, you will have to set up two inner joins.

- So, click on Freshman heading of the "Database studenti" table and drag it onto the Freshman heading of the "Fascia reddito" table.

- Click on Income brackets heading of the "Fascia reddito" table and drag it onto the Income brackets heading of the "Rata per fascia" table.

- Click on Department heading of the "Database student" table and drag it onto the Department heading of the "Rata per fascia" table.

Fig.17: Inner joins between the three tables.

RELATIONSHIPS BETWEEN TABLES   - Complex example
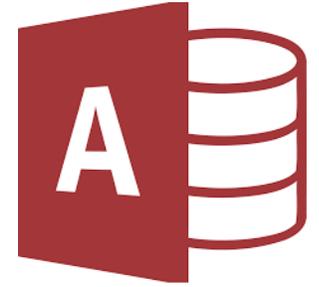
- In the Query Builder impose the sum of the installments and the grouping of departments.

- Remove all the other fields.

Campo:	[DIPARTIMENTO]	RATA
Tabella:	Database studenti	Rata per Fascia
Formula:	Raggruppamento	Somma
Ordinamento:		
Mostra:	✓	✓
Criteri:		
Oppure:		

Fig.18: Query Builder
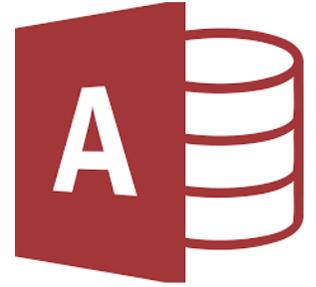
- The query result will open.

Fig.19: Complex example result

- The query result shows, as requested, only two columns:

1. The column containing the departments.

2. The column containing the sum of the instalments for each department.

FURTHER MATERIAL

To review and deepen the topics of this lecture

1. https://www.youtube.com/watch?v=L7xvL9eQ_tY

2. https://www.youtube.com/watch?v=ZmoU_fkG7d8

3. Alexander, M., & Kusleika, R. (2018). Access 2019 Bible. John Wiley & Sons.